NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

DRY HYDRANT
(Each)
Code 432

DEFINITION

A non-pressurized permanent pipe assembly system installed into a water source that permits the withdrawal of water by suction.

PURPOSE

To provide an all weather access and a connection to an available water source to obtain water for fire suppression.

CONDITIONS WHERE PRACTICE APPLIES

At a location where a dependable source of water is available, where transport vehicles can access the site, and where a source of water is needed for fire suppression.

CRITERIA

Site Conditions. Site conditions shall be such that an all weather vehicle access is available to the dry hydrant or can be developed. The dry hydrant shall be reasonably close to the water source to minimize the length of suction line. This should be determined in conjunction with local fire officials. Special care and maintenance will be required when debris and fine soil particles are part of the streambed or pond bottom.

Water Requirement. The quantity to be considered available to a dry hydrant is the minimum available (at not over 15 feet total static lift) during a drought. A minimum of 30,000 gallons (1.1 acre-inches) of pumpable impoundment water or a minimum pump flow rate of 250 gpm without interruption for 2 hours is considered a dependable water supply.

Location. A location map showing the exact site of the hydrant and vehicle access shall be furnished to the local fire department with a copy to the landowner. A letter of approval to use the site shall be obtained from the landowner prior to construction. Fire department personnel should review the access, topography, and location prior to installation.

The fire truck connection shall be within 10 feet of the edge of an all weather access road. The all weather access road and fire truck pumper connection shall be higher than the auxiliary spillway elevation if installed in a constructed impoundment.

Water supply. The adequacy of the water supply from impoundments shall be determined in accordance with appropriate local criteria. The RESOP or similar computer program can be used to determine the water supply contained by earthen construction or water impounding embankments. The adequacy of stream flow source can be determined from regional analysis of stream gage data.

Pipe. The pipe material may be iron, steel or plastic. Plastic pipe shall be schedule 40, SDR-26 or otherwise protected from ultraviolet rays. No more than two 90-degree elbows shall be used in the entire pipe system. Pipe shall be 6 inches nominal diameter or larger.
The pipe shall be fitted withan intake screen or strainer and standard fire truck hose adapters for

quick connect/release operations acceptable to the local fire department.

The depth at which the pipe is installed shall be below the frost-free depth for the area.

Pipe Intake. The pipe intake depth shall be calculated from the design water elevation plus pipe diameter plus 2 feet. The intake screen should have a surface area 4 times the pipe cross sectional area. Where the intake is more than 3 feet off the bottom, a trash rack may be used in lieu of a screen.

A dry hydrant installation shall provide for positive slope toward the water source. In pits or impoundments, the intake screen or strainer shall be supported and secured at least two feet above the pool bottom. The intake shall be at least 4 feet beyond the earth slope.

To avoid a vortex or whirlpool during pumping, the top of the inlet pipe shall be at least 2.0 feet below the design water level unless a special design is prepared to prevent vortex.

Pump Lift. The top of the fire truck pumping connection or centerline of pump (whichever is higher) shall be no more than 15 feet in elevation above the bottom of the fire protection pool or stream surface during drought conditions.

The fire truck connection shall be approximately 24 inches above the ground surface, but never higher than the intake of the using fire truck.

The total lift (pumping head) shall not exceed 20 feet when all losses are totaled. Pumping head for each site shall include head loss from screen or strainer, elbows, line friction, elevation (static head), and hard rubber or flexible suction hose to the fire truck.

Dry Hydrant. Dry barrel (conventional) hydrants may not be used due to excess suction loss and the necessity that they be absolutely airtight.

A recessed hydrant (below ground-level connection) may be specified for use in areas with special needs, such as in a high vandalism area or for low profile and esthetic needs. It is also referred to as a flush mount hydrant and does not require the 24-inch riser. It may be used with the 45^0 or straight dry hydrant head assembly.

Dry Hydrant Head. The hydrant sleeve shall be made of bronze, brass, aluminum alloy or other durable, non-corrosive metal. Sleeve must be permanently affixed inside a PVC head using epoxy adhesive and stainless steel bolts.

The hydrant head shall be able to accept a 6inch NHT (American National Fire Hose Thread) connection to provide maximum supply. Hydrant (6 inch) head shall conform to ASTM 2466.

All hydrants shall contain a removable head strainer and stainless steel snap ring that can be removed without special tools. The strainer shall be conical in shape to maximize straining area. All hydrants shall use a rubber "0" ring between the threaded sleeve and PVC head.

Dry Hydrant Cap. The cap shall be of snap-on/snap-off design and be removable without special tools. It shall be joined with a steel cable or chain and be permanently attached to the dry hydrant head. The cap shall be hard plastic or of the same metal as NHT connection for maximum corrosion resistance.

Strainer. The strainer shall be fabricated from PVC material compatible with the pipe. Individual inlet holes shall not exceed 3/8-inch diameter. All components, including pins, shall be non-corrosive. Manufactured well screens shall be corrosion resistant. Screens and strainers shall have a minimum surface area of 4 times the pipe cross sectional area.

A strainer may be formed by drilling 1/4 inch to 3/8 inch diameter holes with a minimum of one hole diameter between the holes in PVC pipe. Drilled holes shall be deburred and the pipe

cleaned before putting the strainer into service. The screens or strainers shall be capped with a removable end cap.

End Cap. The end cap must be easily removable without special tools. Perforations are recommended in the end cap, to improve flow conditions into the strainer and for jetting action for silt cleanout.

Access. Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access shall have an all-weather surface, be well drained and be at least 12 feet wide for ease of movement by personnel and equipment during an emergency. When local road traffic may be involved, an all-weather road surface adjacent to the dry hydrant and completely off the public road is recommended for safety of the emergency personnel and the public.

Protection. After the dry hydrant installation, the site shall be graded for surface drainage and vegetated or otherwise protected from erosion. Vegetation shall be in accordance with the Critical Area Planting Standard and Specification (342).

CONSIDERATIONS

1. Effect of the use of the dry hydrant on upstream and downstream water quantity.

2. Sediment production caused by erosion during construction.

3. Possible effects on surface and ground water of spilled fuels and lubricants by fire trucks using the dry hydrant.

4. This practice has the potential to effect National Register listed or eligible (significant) cultural resources (archaeological, historical or traditional cultural properties); it also has the potential to protect listed or eligible historic structures. Consider these factors during planning and also follow the NRCS State policy during construction and maintenance.

PLANS AND SPECIFICATIONS

Plans and specifications for installing dry hydrants shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Required permits shall be obtained prior to initiating any work.

OPERATION AND MAINTENANCE

A plan for operation and maintenance of the dry hydrant shall be prepared for and reviewed with the landowner and fire company prior to construction. The following items, and others as needed, shall be included in the O&M plan:

Keeping the site clear of obstruction and regular mowing of the dry hydrant access area will be required to keep the area readily available for emergency use.

Pumper testing of the dry hydrant shall be done at least annually to verify site usability. This test shall include back flushing, followed by a pumper test at the maximum designed flow rate. Careful attention should be given to silt, debris, aquatic growth, or other interference that may limit the full operation of the dry hydrant.

Checks of the intake screen should be made once every five years to identify any sediment build up and to provide information for a clean-out operation or for aquatic growth control needs. The hydrant should be back-flushed each spring and fall to remove any silt or debris that may have accumulated on the screen.

DRY HYDRANT
DESIGN AND CHECK DATA REQUIREMENTS

The following items must be documented for dry hydrants.

Survey Record

1. Elevation difference between bottom of stream or pond and ground surface at fire truck access.
2. Cross section along hydrant centerline.
3. Plan view of hydrant, truck access and water source (pond or stream).

Design Record

1. PA Utility Act compliance.
2. Erosion and sediment control plan.
3. Soils investigation for excavation.
4. Verify water availability (1.1 acre-inches or 250 gpm for 2 hours)
5. Verify total lift (head loss) is less than 20 feet.
6. Pipe size and fittings to meet fire truck needs.
7. 12 feet wide all weather access.
8. Lime, fertilizer, seeding requirements.

Check Data Record

1. Elevations at inlet and outlet of hydrant.
2. Pipe installation, bedding, and backfill.
3. Length of pipe
4. Fittings, strainer or screen, and end cap.
5. Seeding performed.

Operation and Maintenance Plan

Annual pump test.

Semi-annual back flushing.

Five year inspection of intake screen.

Mowing, debris removal, and other routine maintenance.

All weather access for fire trucks, including snow removal if needed.

Quality Assurance Plan

What specific items need inspection and when?

Who will do the actual inspection?

Is any testing equipment required for the inspection?

DRY HYDRANT
INSTRUCTIONS FOR USE OF SPECIFICATION 432

1. APPLICABILITY

Construction Specification 432 is applicable to installation of dry hydrants.

2. ITEMS TO BE INCLUDED IN SECTION 6 AND/OR DRAWINGS

a. Material requirements, including but not limited to:

   (1) Pipe size, type, and quality.
   (2) Bedding material if applicable.

b. Dimensions of the area to be lined

c. Special foundation requirements, including drainage, and treatment with a soil sterilant where needed.

d. Location and type of outlet for leak detection system

e. Sealing requirements at pipes, ramps, or other appurtenences

f. Any special field quality control testing requirements

g. Reference to other practice specifications (e.g. 606, 313P, 382, 342), if applicable.

h. Safety components, including means of emergency egress, fence, signs

i. Erosion and sediment control

j. Vegetative requirements

CONSTRUCTION SPECIFICATION

432. DRY HYDRANT

1. SCOPE

This work shall consist of furnishing materials and installing all components of the dry hydrant system as outlined in this specification and the drawings.

2. MATERIALS

All materials furnished and installed shall conform to the quality and grade noted on the drawings, set forth in Section 6, or as otherwise listed below.

All materials shall be new, with manufacturers' warranties, as applicable. Their estimated minimum service life shall be 10 years or more or as otherwise specified in Section 6.

a. Pipe. The pipe material installed for the hydrant system shall conform to the following specifications:

Iron	ANSI/AWWA C151/A21.51
	ANSI/AWWA C115/A21.15
Steel	ASTM-A-120, AWWA-C-202
	ASTM-A-53
	ASTM-A-134
	ASTM-A-135
Plastic	PVC ASTM D1785
	PVC ASTM-D-2241 SDR-26+
	ABS ASTM-D-2282 SDR-26+

The pipe and fittings, where applicable, shall be marked by the manufacturer as described in the applicable ASTM or ANSI/AWWA specification. Fittings shall be rated, in strength and quality, equal to the pipe being specified.

Joints shall be air and water tight and shall meet the requirements of the applicable ASTM or ANSI/AWWA standards.

b. Dry Hydrant Head. The hydrant sleeve shall be made of bronze, brass, aluminum alloy or other durable, non-corrosive metal. Sleeve must be permanently affixed inside a PVC head using epoxy adhesive and stainless steel bolts.

The hydrant head shall be able to accept a 6-inch NHT (American National Fire Hose Thread) connection to provide maximum supply. Hydrant (6 inch) head shall conform to ASTM 2466.

All hydrants shall contain a removable head strainer and stainless steel snap ring that can be removed without special tools. The strainer shall be conical in shape to maximize straining area. All hydrants shall use a rubber "0" ring between the threaded sleeve and PVC head.

c. Dry Hydrant Cap. The cap shall be of snap-on/snap-off design and removable without special tools. It shall be joined with a steel cable or chain and be permanently attached to the dry hydrant head. The cap shall be hard plastic or of same metal as NHT connection for maximum corrosion resistance.

d. Strainer. The strainer shall be fabricated from PVC material compatible with the pipe. Individual inlet holes shall not exceed 3/8-inch diameter. All components, including pins, shall be non-corrosive. Manufactured well screens shall be corrosion resistant. Screens and strainers shall have a minimum surface area of 4 times the pipe cross sectional area.
A strainer may be formed by drilling 1/4-inch to 3/8-inch diameter holes with a minimum of one-hole diameter between the holes in PVC pipe. Drilled holes shall be deburred and the pipe

cleaned before putting the strainer into service. The screens or strainers shall be capped with a removable end cap.

e. End Cap. The end cap must be easily removed without special tools. Perforations are recommended in the end cap, also, too improve flow conditions into the strainer and for jetting action for silt cleanout.

3. EQUIPMENT REQUIREMENTS

All equipment furnished as part of the dry hydrant system shall be compatible with the local fire departments equipment.

4. COMPONENT INSTALLATION

All components of the system shall be installed to the lines and grades as shown on the drawings.

All equipment shall be installed to the manufacturers' recommendations. The final installation shall be certified by the installer as to meeting all guidelines, recommendations, or requirements of the manufacturer and this specification.

a. Pipe. The pipe shall be fitted with intake screen or strainer and standard fire truck hose adapters for quick connect/release operations acceptable to the local fire department.

PVC pipe shall be protected from ultraviolet rays by painting with an exterior latex or similar paint.

The depth at which the pipe is installed shall be below the frost-free depth for the area.

All pipes shall be installed to provide water tight and airtight joints.
Pipe shall be placed on undisturbed soil or non-yielding compacted material. Over excavation must be corrected as noted on the drawings or as directed by the responsible engineer or his designated representative.
Backfill shall be placed so as not to damage the pipe nor disturb alignment in any way. All pipes shall be properly bedded as designated on the drawings or in Section 6.

b. Pipe Intake. The pipe intake shall be installed at the depth shown in the drawings. Where the intake is more than 3 feet off the bottom, a trash rack may be used in lieu of a screen.

A dry hydrant installation shall provide for a positive slope toward the water source. In pits or impoundments, the intake screen or strainer shall be supported and secured at least two feet above the pool bottom. The intake shall be at least 4 feet beyond the earth slope.
c. Access. Vehicle access to and from the dry hydrant shall be provided for fire truck and pumper units. Access shall have an all-weather surface, be well drained and be at least 12 feet wide for ease of movement by personnel and equipment during an emergency.

d. Protection. After the dry hydrant installation, the site shall be graded for surface drainage and vegetated or otherwise protected from erosion.

5. CERTIFICATION

The dry hydrant system shall be certified by the contractor responsible for the final installation to the fact that it conforms to all the applicable construction specifications and requirements of the material or equipment manufacturers.

6. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE: